FOUNDRY TRADE JOURNAL
Established 1902
WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

Vol. 83 Thursday, December 11, 1947 No. 1632

49, Wellington Street, London, W.C.2
'Grams: "Zacatecas, Rand, London"
'Phone: Temple Bar 3951 (Private Branch Exchange)
PUBLISHED WEEKLY: 21s. per annum (Home and Overseas)

Delivery Control

In the future, the operation of "M" forms is to be varied, and after March 31, 1948, they will lapse, to be replaced by a new form. It seems that in the whole of the iron and steel industry there has been a paper accumulation of unfulfilled orders amounting to something of the order of 1,500,000 to 2,000,000 tons. The Government is not convinced that these represent serious business, and the practical effect of the new conditions will be to invalidate all orders which are not delivered in any one quarter, unless they be "revalidated" by the appropriate Government authority. This word "revalidated," which the Ministry has coined, really means "revived." These conditions do not at this early examination appear to us to be suitable for application to the ironfounding industry as a whole. We have just been engaged on the preparation of an article for the Press, which describes the making of a low-pressure turbine casing. The moulding alone took exactly 12 weeks or virtually one-quarter of a year. The very placing of such an order would be a contradiction of the terms of the proposed order, yet it is but typical of an important section of heavy industry. Next there are the contracts, wherein a large order is placed so as to warrant the making of the best type of pattern; then, according to the situation in the customers' machine shops, varied deliveries are requisitioned each month. This sort of business will, we should imagine, be difficult to reconcile with the conditions to be imposed.

Again, for the economic conduct of a jobbing shop, be it an iron or steel foundry, the type of order which can be accepted varies according to the availability of suitable men and machines, and any attempt to interlock these with the periodic scrapping of undelivered orders will make existing confusion more confounded. The new conditions are not to apply to pig-iron or coke, which will still follow the established system, yet the supply position is but little different from that of steel. We presume from its exclusion that the commitments entered into by both pig-iron and coke makers can, in the Government's view, be met, and that they are not burdened with a plethora of unfulfilled orders.

At the Press Conference whereat the new conditions were disclosed, the Minister admitted that more work would be imposed upon industry, but he felt that, once it was established, the statistical position would at least be more realistic. It is obvious that for industry to function properly, there must be a reserve of undelivered orders, for steelworks and foundries must be allowed to do their own bit of planning. Backlogs, as the Ministry and the Americans term undelivered orders, are very valuable internally as showing the trends of business, and to our mind their future exclusion is a catastrophe of major importance. We freely admit that there should have been in the past a closer examination of the subject of this lengthening of undelivered orders, but their proposed quarterly elimination will have unsuspected repercussions. When foremen and charge hands visited the sales office and noted that the charts showed every department was assured of full-time employment for six or even nine months, the gossip taken back to shops spread a desirable sense of security. The quarterly clean slate will have the reverse effect. As far as we can see, the new conditions to be imposed will, so far as the foundry industry is concerned, be almost intolerable.

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Correspondence

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

THE CARBURISATION OF MOLTEN CAST IRON

To the Editor of THE FOUNDRY TRADE JOURNAL

SIR,—I have noticed in the *Foundry Trade Journal* of April 8, 1943, p. 289, the subject of discussion being the "Production in Rotary Furnaces of Steel for Casting," that Mr. Goodwin states: "It is possible to raise the carbon content in the furnace possibly as high as 1.3 per cent. and very much higher, when making malleable iron and using no pig-iron." "It can only be done within a certain period of the melt." "It is useless trying to raise the carbon by 'artificial methods' once the metal was molten; this was impossible, but it was possible to raise the carbon content to 2.6 per cent., using anthracite for recarburising."

These remarks on raising the carbon content of the bath interest me very much, because I have a new rotary furnace in which I have failed twice to raise the carbon content of the steel bath to such a level as to make high duty cast iron by trying to put 100 per cent. more coke than required for the iron underneath the steel scrap before melting it.

Finding that the carbon was not picked by the molten metal, I have tried to recarburise by introducing coke in the bath, which was very difficult in the presence of the rotary furnace viscous slag. A complete charge of one ton steel scrap was clear melted in one hour, and the flame of the oil-fired furnace was using approximately 5 per cent. more oil than required for complete combustion. I will be very grateful to you if you will kindly help me to find a solution to my problem of introducing carbon to steel scrap to enable me to make high duty cast iron.

MOHAMED EL SABBA SAID (MAJOR).

11, Abu Bakr El Sidik Str.,
Heliopolis,
Egypt.
November 20, 1947.

[Readers views would be appreciated, as we too have experienced the same difficulty using electric furnaces. It is not a question of furnace-type. Moreover, why is the pick-up figure of 2.60 per cent. carbon, which can be confirmed, the normal maximum?—EDITOR.]

A CORE GOES AWRY

To the Editor of the FOUNDRY TRADE JOURNAL.

SIR,—Mr. Gudgeon queries my letter dealing with this problem. The tube is ⅜ in. thick. Inserting the tube in the mould when still hot reduces the chilling effect and I have received no complaint with regard to the machinability of the casting when being bored out.

The core is vented in the usual way, and the tube itself is removed in the machining operation.—Yours, etc.,

A. SERGEANT.

"Bank Mawr," Sketty, Swansea.

[This letter relates to the substitution of a steel tube for a sand core for putting a small hole in a thick casting.—EDITOR.]

Forthcoming Events

(Secretaries are invited to send in notices of meetings, etc., for inclusion in this column.)

DECEMBER 15.

Sheffield Society of Engineers and Metallurgists

Symposium on "The Use of Liquid Fuel in Open-Hearth Furnaces," at the Royal Victoria Station Hotel, Sheffield, at 6.15 p.m.

DECEMBER 17.

Institute of British Foundrymen.

London Branch:—Supper, Dance and Cabaret, at 7 for 7.30 p.m., at the Café Royal, Regent Street, London, W.1.

North Western Fuel Luncheon Club.

Guest speaker Lord Woolton. "Matters of the Moment," at 12 noon for 1.15 p.m., at the Engineers' Club, Albert Square, Manchester.

Institution of Production Engineers.

Liverpool Sub-section:—"Mechanical Handling," by A. A. Simpson, in the Arts Theatre, Liverpool University, at 7.15 p.m.

Manchester Association of Engineers.

Students Section:—Annual Dance at the Apollo, Ardwick Green.

DECEMBER 18.

Institution of Production Engineers.

Glasgow Section:—"Cutting Lubricants and Coolants," by H. H. Beeny, at 7.30 p.m., at the Institution of Engineers and Shipbuilders, Glasgow, C.2.

DECEMBER 19.

The Institute of Metals.

Sheffield Section:—"Surface Finish and Electrolytic Polishing," by H. Evans, at the Mining Lecture Theatre, The University, St. George's Square, Sheffield, at 7.30 p.m.

THE BOARD OF TRADE announce that, following the publication of new Trading with the Enemy orders, there can now be a full resumption of trade between the United Kingdom and Austria. It should be noted, however, that money and property in the United Kingdom at the date of the orders belonging to persons resident or carrying on business in Austria and income deriving therefrom, continue to remain under Board of Trade and Custodian of Enemy Property Control.

PHILIPS ELECTRICAL, LIMITED, of Century House, Shaftesbury Avenue, London, W.C.2, have acquired the sole manufacturing and marketing rights of the "Scrivener Clarifier" for coolant-oil. This apparatus consists of attachment to grinding machines of a small distributor tank to which the coolant is fed through a restricted channel past a rotating disc. This carries a number of powerful magnets which pick up the metallic grit and wiper arms remove it quite automatically into a separate discharge channel.

YESTERDAY, before the Belfast Association of Engineers, Mr. A. Marshall and Mr. A. N. Gilchrist, of the Broomside Boiler Works Company, Limited, of Motherwell, gave a lecture on "Some Aspects of Modern Welding."

Melting Steel and High-Duty Irons in an Oil-fired Rotary Furnace

By W. J. Roscrow

[The object of this article, which gives operating details of a 30-cwt. oil-fired Stein & Atkinson rotary furnace installed at the works of Holman Bros., Limited, Camborne, for the purpose of making both steel and high-duty cast irons, is to revive interest in a subject somewhat neglected in recent times.]

Although the normal production of this foundry is of high-duty irons made by the "Meehanite" process, the shortage of steel castings necessary for the firm's own products has enabled a considerable amount of experience to be obtained in the production of carbon steels from this type of furnace. The furnace has also proved itself capable of producing high-duty irons of consistent properties using inoculation and wedge control, at a temperature unattainable in the cupola.

An appreciation of the furnace installation can be obtained from Fig. 1. Whilst both fuel oil and creosote pitch have been used for combustion, the latter has been predominantly burned. Preheated air is used, the exhaust gases being led *via* the exhaust elbow to the recuperator for heating the incoming air and then to the chimney.

Lining

The furnace as employed at Camborne is acid lined, using rammed monolithic refractories, and too much care cannot be exercised in the preparation of these linings if satisfactory life is to be achieved. High-duty irons cause but little wear on the lining and a dozen or more heats of this material can be obtained from a lining in which steel melting is no longer practicable.

Personal experience is that rotary furnaces have two disadvantages when used for steel-making which offset their advantages. First, all furnace wear is concentrated at the burner end, due apparently to flame impingement, and, secondly, because of the fact that, unlike other steel furnaces, the hearth is rotating, satisfactory fritting of the lining is much more difficult to obtain. If a frit spalls during a heat, it is difficult to obtain the necessary temperature in the bath.

Lining Materials and Method of Ramming

Table I shows screen analysis and chemical composition of the separated bond from two typical lining materials. No. 1 is a very satisfactory lining material of somewhat finer texture than No. 2. Both consist of a base of white quartz grains, but the refractoriness depends on the bond employed. This seems to be of outstanding importance in successful fritting.

The furnace shell is rammed whilst in a vertical position, with the burner cone end of the furnace in the ramming pit. When once the ramming has commenced it is advisable to continue without any breaks until completed, and in any case the burner cone should be completed without any long delay. The lining material is rammed at 6.5 per cent. moisture content (checked by the Speedy moisture tester) with a heavy type (50 lb.) pneumatic rammer. The rammer is fitted with a wedge-shaped tamping head, which gives a much more effective ramming. Metal formers are used throughout as shown in Figs. 2, 3, 4 and 5.

Ramming is commenced with former No. 1 (Fig. 2) held in position with a bolt through the plate as shown in Fig. 4. As each former to shape the cone end is needed, a longer bolt secures it to the bottom. The lining is well rammed in the furnace, making layers of 1¼ in. thickness between each successive ramming.

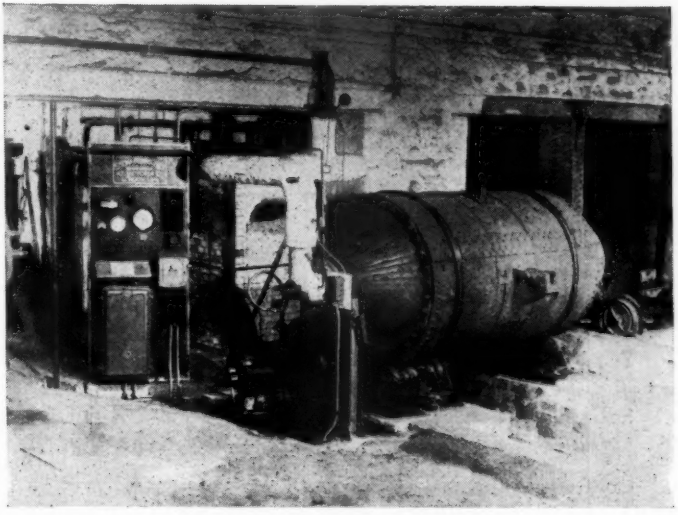

FIG. 1.—LAYOUT OF THE ROTARY FURNACE.

Rotary Furnace Meeting

TABLE I.—*Screen Analyses of the Bond of Two Proprietary Monolithic Linings.*

Material.	Screen Analysis after separating Quartz fragments.											Percentage Composition of Separated Bond.
	8.	10.	16.	22.	30.	44.	60.	100.	150.	200.	Pan.	
No. 1	0.21	0.12	0.45	0.32	1.10	2.3	6.6	15.27	11.94	12.35	16.35	SiO_2 .. 86.10 Al_2O_3 .. 2.6 Fe_2O_3 .. 1.4 Clay .. 33.0
No. 2	0.40	—	0.14	0.10	0.36	0.56	1.69	19.20	27.29	17.22	6.97	SiO_2 .. 83.8 Al_2O_3 .. 1.7 Fe_2O_3 .. 1.8 Clay .. 25.6

When the burner cone end is completed the three formers are withdrawn and ramming is continued, using the metal former, Fig. 3, which forms the entire body. Each time the ramming reaches the top of this former the bolts are tightened to reduce its diameter, and it can then be easily withdrawn and repositioned for continuing ramming.

The lining must be well vented during ramming, and the method adopted at Camborne is to use cord threaded through the ½-in. diameter holes in the furnace shell and placed throughout the thickness of the lining. Ramming is continued as densely as possible to the top of the body. The top cone is formed by segments shown in Fig. 5, held in position on a central pole and by small wood blocks nailed into position on the rammed wall of the furnace. After these segments have been positioned, the top cone is bolted into place and rammed as before, the exhaust opening being finished with a row of cupola segment bricks. To withdraw the segments, cord is threaded through to prevent them from dropping into the furnace, and then the bottom plate is unbolted, which releases the centre pole and enables the segments to be withdrawn through the exhaust end by means of the cord.

TABLE II.—*Rotary Furnace Record—Steel.*

Heat No. Q9. Date, 10.9.47.
Charge for 2 tons steel; 20 cwts. mild steel plate; 13 cwts. heavy section carbon steel; and 7 cwts. G.K.B. hematite pig. *Additions:* 16 lbs. FeSi and 120 lbs. FeMn.

Time.	Remarks.	Temp., deg. C.	
		Air.	Exhaust.
3.7	Furnace relit, fuel temp., 180 deg. F. ..	200	375
4.0	By-pass to recuperator opened ..	280	860
4.15	Fuel temp., 196 deg. F.	300	920
4.45		340	1,000
5.15	Burner out. Bath sample .. .. Ore added. Carbon, 0.65 per cent.	385	1,000
5.25	Burner replaced	375	935
5.50	Burner out. Bath sample Ore added. Carbon, 0.40 per cent.		
5.55	Burner replaced	375	935
6.25	Slagged off. Bath sample. Carbon, 0.23 per cent.		
6.35	Additions made. Burner replaced ..	360	900
6.48	Tap.		

Composition of steel, C 0.37; Si 0.15; Mn 0.45; and P 0.05 per cent.

Drying

Drying the shell is a lengthy procedure, and very great care must be shown. The lining should be slowly dried by means of a coke fire placed beneath it for at least three weeks before the shell is placed in its working position. The method adopted at Camborne is then to run four or five high-duty iron heats to glaze the lining before starting on steel melting. Fettling and repairing of the furnace lining after wear from steel heats can be carried out by using a mixture of silica sand, new lining material, and a small amount of slag. This is thrown into the furnace after a heat, full flame is again applied, and the patch frits satisfactorily if the lining wear is even.

No more than a small portion of the furnace at one time must be fritted, each successive frit following until the diameter is completed. Some linings are better suited for fritting by this method than are others of similar chemical composition. If the furnace be allowed to cool and then heated again great care must be taken at about 575 deg. C., owing to the well-known fact that at this temperature quartz undergoes a sudden and reversible expansion. This also applies to the initial heating of a new lining.

Furnace Operation

For steel melting the practice adopted is to work the charge down as is usual in most acid steel processes. A high carbon charge is used to obtain a bath of 0.70 per cent. carbon, which is brought down with

TABLE III.—*Rotary Furnace Record—High-Duty Cast Iron.*

Heat No. Q7. Date, 8.9.47.
Charge for 30 cwts. high duty iron. 19 cwts. foundry returns (risers, etc.), and 11 cwts. G.K.B. hematite pig. *Additions before Tapping:* 13 lbs. FeMn and 8 lbs. FeSi.

Time.	Remarks.	Temp., deg. C.	
		Air.	Exhaust.
p.m.	Furnace cold.		
1.15	Furnace lit	—	—
1.30	Fuel temp., 180 deg. F.	75	340
2.45	Start rotating	250	720
3.30	Fuel temp., 184 deg. F.	350	935
3.48	Burner out; additions made	375	990
3.50	Burner replaced	375	940
4.0	Tapped.		

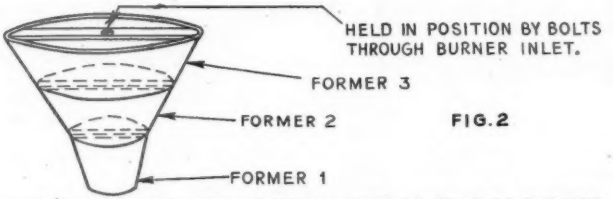

FIG. 2

THE 3 FORMERS FOR RAMMING BURNER CONE OF FURNACE.

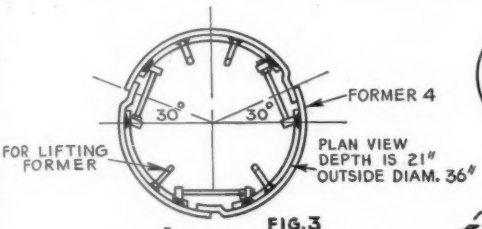

FIG. 3

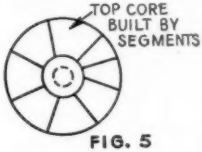

FIG. 5

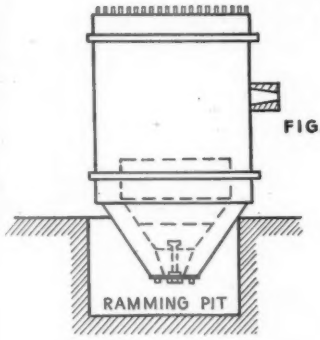

FIG. 4

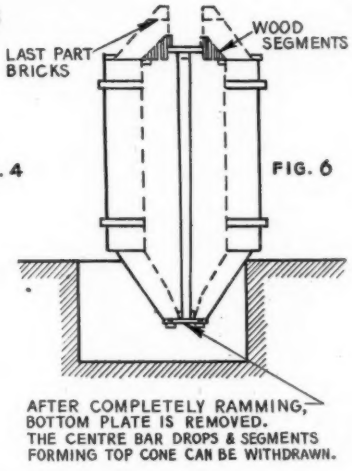
LAST PART BRICKS
WOOD SEGMENTS
AFTER COMPLETELY RAMMING, BOTTOM PLATE IS REMOVED.
THE CENTRE BAR DROPS & SEGMENTS FORMING TOP CONE CAN BE WITHDRAWN.

FIG. 6

FIGS. 2-6.—USE OF FORMERS FOR LINING THE ROTARY FURNACE.

ore to 0.2 per cent. carbon, making use of the exothermic reactions so that after final additions the carbon content is 0.30 to 0.35 per cent. If it is desired to shorten the heat a lower carbon charge can be utilised without ore additions, although the carbon reduction by the use of ore and flame control can be fairly rapid, as Operation Sheet, Table II, shows. Slagging is carried out by opening the slag hole and rotating the furnace slowly until the hole is at an angle sufficient for easy flow of the slag. Grain size is controlled by ladle additions of aluminium. Bath samples can be obtained by taking samples from the slag hole or by withdrawing the burner and inserting the sampling spoon at the exhaust end of the furnace.

The melting technique when making high duty irons in the rotary is different from that normally employed in the cupola. Owing to the somewhat oxidising action of the flame no steel scrap is charged. A normal charge consists of high duty iron returns and hematite pig; additions of ferro-silicon and ferro-manganese are made before tapping. Tapping temperatures are considerably higher than can be obtained from the cupola. The metal is inoculated in the runway and controlled by wedge tests before pouring. It is normally sufficiently hot to allow the use of alloy additions in the ladle. Operation sheet, Table III, is for a typical iron heat.

Physical Tests

Comparable test results with other steel-making processes are regularly obtained. The tests for the steel when annealed are of the following order:—Yield point, 17.12 tons per sq. in.; ultimate stress, 32.08 tons per sq. in.; elongation, 22.5 per cent.; reduction of area, 22 per cent., and Brinell number 137.

Physical test values for high duty irons made in the rotary furnace are also high and the microstructure shows very fine graphite formation and a pearlitic matrix. Tensile strengths between 23 and 26 tons per sq. in. are obtained with freely machinable metal. The graphite is, generally, somewhat finer than in cupola melted material of similar composition.

In conclusion, the writer wishes to acknowledge the courtesy of the Directors of Messrs. Holman Bros., Limited, in giving their permission to publish the information in this article.

PROF. EUGEN PIWOWARSKY has been appointed Dean of the Faculty of Metallurgy and Mining at the Technical University of Aachen.

Weld Repair of Grey Iron Castings

An important forward step in the weld repair of grey iron castings is the production of a composite electrode having a pure nickel wire core wrapped with copper strip and this combination enclosed in a mild steel sheath and flux coated. This electrode is deposited with straight polarity D.C. holding a relatively short arc. The high nickel content makes it inadvisable to hold it at high temperatures longer than is necessary; therefore it is recommended that deposits be made with a minimum of stops and starts, and that stops should be made gradually rather than abruptly, to lessen the rapid chilling as much as possible.

When these simple rules of procedure are observed, the deposit from this steel-bearing electrode is fine grained and soft and has tensile strength equal to that of the casting. It is also iron grey in colour. The one disadvantage is that a zone of hardness is produced at the line of fusion, making this type of repair unsatisfactory in locations that have to be machined. Consequently this type of composite electrode finds best application in the filling of blowholes where no machining is to be done. This being a rigid type of weld, peening after each deposit is recommended, to relieve stresses and to reduce the chances of shrinkage cracks. The deposit is easily finished smooth by either grinding or filing.

Machinable Arc Welds

A procedure for obtaining fully machinable arc-welds in cast iron, to be described here, will be more readily understood if the cause of hard spots is briefly reviewed. The principal constituents of grey cast iron are iron and soft graphitic carbon. When the iron is heated to fusion temperature some of this carbon is dissolved and rapid cooling, chiefly caused by the chilling effect of the mass of metal adjacent to the weld, results in the formation of hard carbides of iron in the melted metal zone. Procedures are now available, and have been widely used for several years, for reducing this hardening effect to the point where it does not cause machining difficulties. This development has vastly broadened the field of usefulness for metal arc welding in the grey iron foundry industry.

The electrode used is a fabricated electrode consisting of a pure nickel core wire enclosed in a sheath of pure copper, and flux coated. It contains no iron or other carbide forming ingredients. The distinguishing feature of this electrode is that when properly applied the entire weld is machinable, including the line of fusion. It can be applied with either direct or alternating current, in all positions. When used with direct current the electrode is connected to the positive terminal of the welding machine (reverse polarity).

This electrode is not made in sizes larger than $\frac{5}{32}$ in. dia. because it has been found that the use of larger sizes will cause too much heat generation in the parent metal and too great a degree of admixture of the fused parent metal with the deposit, both of these conditions tending to increase the width of a somewhat harder zone at the point of admixture with the parent metal. For the same reason it is recommended that the lowest current values be used, just enough to be sure of fusing the deposit to the parent metal. Further restriction of the heat zone is obtained by always depositing straight beads, and avoiding weaving. It should be noted that the deep penetration that is often so desirable when arc welding mild steel is studiously avoided in this procedure.

Additional Precautions

Additional precautions can be taken to reduce hardness. When the deposit must cover an edge or corner, even if the corner angle is not sharp, care should be taken not to hold the arc directly on the edge, because the breaking down of the edge produces a larger mass of fused base metal than is desirable. The arc should be held either on a previously deposited bead or on the base metal adjacent to the edge, so that the deposit flows over on the edge without breaking it down. When the width of the area to be covered makes it necessary to deposit a series of parallel beads, the first bead should be deposited where machining difficulties are least likely to be encountered. Then, in depositing the second bead, the arc should be held mostly on previously deposited metal. The process is repeated with subsequent beads. It is not difficult to secure an adequate bond between the deposit and the base metal, with a minimum of penetration by following this procedure. If a blowhole is to be filled, the

(*Continued on page* 308.)

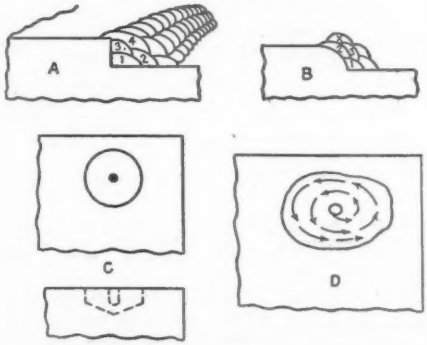

FIG. 1.—METHOD OF AVOIDING BREAKDOWN OF SHARP EDGES OR CORNERS WHEN ARC WELDING.

*Extracted from an article which appeared in "The Iron Age."

★ Personnel Recruitment ★

Mr. R. O. Patterson's Presidential Address

It is a matter of regret that in presenting an abstract of Mr. R. O. Patterson's address to the Scottish Branch of the Institute of British Foundrymen we have had to miss out his worth-while views on leadership and confine ourselves to his statements on personnel recruitment.

An Urgent National Service

In the course of his address Mr. Patterson said:—Captain Shanks and Gentlemen,—Those of us in the foundry industry, who believe in getting to grips with the present and not wasting time quarrelling or lamenting over the past or day-dreaming about an impossibly rosy future, appreciate the need for something more than metals with higher strength, foundry mechanisation or better working conditions. For these things will avail us nothing unless we have men who will willingly and in full measure apply themselves with all the energy, skill and ingenuity they showed when they made names like Carron and Falkirk world-famous and thereby rendered a great service to the country. To-day, our foundries are entrusted with the job of providing the castings necessary to re-equip our industries with much-needed plant. We must also supply the basic material for the machinery we are so anxious to export, and our job has now become a National service.

Due to our inability to meet national requirements, much attention has been given to foundries and foundrymen during the past year, and there has grown a feeling with the general public that a job in a foundry is not desirable. This harmful prejudice against foundry work as a career has not come directly from foundrymen, but is more the result of talk by people whose knowledge of foundries is limited to an occasional visit. A factory inspector visiting a foundry directly after a visit to a creamery is liable to make comparisons which are as unfair as they are unreasonable.

I do not mean by this that foundry conditions are ideal or that we should do nothing to improve them. Good housekeeping on the part of the foundry owners and managers is essential, and amenities which will in any way improve conditions of employment for foundrymen must be provided as soon as practicable. However, the gap of six years in the training of craftsmen cannot be extended until our foundries have all the improvements we would like to see, and we must therefore make now the best offer we can to job seekers and boys leaving school if we are to fulfil with British labour the service entrusted to us.

Selling Foundry Jobs

In advocating foundry work as a career to man, boy or parents, we are offering a sound proposition to those who will think carefully of the future. Let us be honest, however, in the way we sell this career. Let there be no misunderstanding of the conditions which are necessary for the fulfilment of our work, for we want all those we engage and train to remain in the industry. We must, therefore, take the greatest care in the way we advertise, for we want to sell this career only to those who are likely to do it credit.

There are two main methods which can be adopted in any sales campaign. The first might be styled high-pressure salesmanship. This relies on good propaganda by way of news reels and brightly coloured posters with a catch slogan—in our case, proclaiming the foundry as a good place in which to work. The posters most probably would depict the best corner of the most modern State-financed foundry in the country—most probably eeconomically unsound—with all the glamour of a spectacular cast—that one minute operation which may be the climax to 12 weeks' hard work.

The other method of salesmanship is covered by the word "Goodwill." It is dependent on our past performance and our salesman for this can only be men who have found the foundry a place in which they have had a reasonably happy and prosperous life. Our samples must be the foundries operating at present. This method is the one I believe we should adopt, and our first efforts should be directed towards establishing with the public in general the dignity of the trade and the appreciation due to our present craftsmen. This done, we can then direct our attention towards the recruitment of the young men and boys so necessary to the future of our industry. First impressions are often misleading and this is especially so of the foundry. Unfortunately, our moulding materials can best be described by the uninitiated as "dirt" and newcomers will continue to think of these materials as dirt until they are able to appreciate their usefulness. If, therefore, boys in their last year at school can be allowed to come into the foundry and taste the pleasure of creating some useful or ornamental object by the use of sand and metal, their interest will far outweigh any objection they may have had to the first appearance of the foundry as a workshop. When we have allayed the present prejudice against foundry work, overcome possible misleading first impressions and aroused the interest of potential apprentices, what are the prospects the foundry has to offer?

Foundry Opportunities Defined

The foundry offers employment in a highly skilled basic trade, which is essential to the wellbeing of our country. All foundryworkers to-day are giving a service to the nation. It is a trade in which the work is creative; there is unlimited scope for the man with initiative and an inventive mind, and there is reasonable prospect of earned advancement.

Its trades are practised in every country in the world and for the man or boy who feels that at some time he would like to travel, there is no better introduction abroad than that of being a skilled craftsman. It is a trade in which a craftsman with a belief in private enterprise may go into business on his own account

Personnel Recruitment

with relatively small capital. It is a trade with an absorbing historical background and, for the man so minded, the arts of founding will provide much interest. Finally, it is a trade where a man can earn a good living—sufficient to maintain a wife and family at a reasonable social level.

In addition to this, we should make it clear that at work in a foundry a person will become dirty. The work requires manual effort—one may be required to lift moderate weights. On occasions one is uncomfortably hot for short periods of time. The condition of the atmosphere will on occasions be short of ideal, but need never be unhealthy. In the foundry an unsuccessful scholar has an even chance with the other boy, but—make no mistake—to be a successful foundryman requires both skill and effort.

A Factual Statement

Statements such as I have made are, no doubt, acceptable to foundrymen, but to the young men and parents of the boys we want to recruit, these statements require to be presented as facts. Let us see how far we can substantiate them. In the foundry to which I am attached, there are men who live very full lives, own their houses and have children at the university. There are men who shoot and fish, who play golf or own chicken farms. There are men who take leading parts in civic affairs, who hold office in the Church and many who, in general, live lives as full and as interesting as do most people. All the foremen attached to this foundry have been promoted from craftsmen and others have left us to become foremen elsewhere. Many moulders have left this country to carry on their craft in other lands and our Government has invited foreign moulders to work here. Two foundrymen in this district have opened their own foundries in the last year and are now successful employers. It is thus evident, therefore, that the foundry can provide a stable, useful and interesting occupation, but there is still another feature of employment worthy of our consideration.

A Curious Situation

When men discuss work or conditions of employment, wages take first place in their minds, but I believe that a good second to wages will be the relationship between men and their employers, their managers and their foremen. The foundries with the best tea-making facilities, baths, canteens and even the highest wage incentives have not induced a greater flow of new labour towards them. On the other hand, there are foundries where conditions might be described as primitive, where men continue to work contentedly and where boys are engaged as required. Sometimes this is because of the lack of alternative employment, but it is not always so. There are foundries in which the good relations between masters and men outweigh the advantages of more modern amenities offered elsewhere. Amenities can be bought—good relations with labour are something we must do more to cultivate and I venture to suggest that good relations are the result of good leadership.

The President then elaborated his views on leadership and concluded by saying that to-day all men of sense agree that there is no primrose path ahead. There is a way which leads to a precipice from which there is no rescue. Or there is a steep and difficult way at the top of which there is no promised land flowing with milk and honey, but only a land somewhat more tolerable than that in which we are now living. If we are to reach that land, it can only be by our industrial effort. Our ability to achieve success depends in no small measure upon our possessing in sufficient numbers men with the qualities of leadership in all grades throughout industry.

This is the challenge which the present time has laid before the young men in the foundry. Are the young men in our Institute prepared to accept this challenge? Can they provide the leaders we require? Can they attract to the industry the type of youth who will successfully follow them in that leadership? Only the future can satisfactorily answer these questions, but by their presence here this afternoon—not directed, but of their own free will—I feel certain they can face the challenge and that they can win.

Weld Repair of Grey Iron Castings

(*Continued from page* 306.)

same effect is obtained by starting at the centre of the defect and working spirally outward, again holding the arc mostly on previously deposited metal. An intermittent (skip-welding) technique is also useful in reducing the heat input and avoiding distortion. Methods of avoiding breakdown of sharp edges or corners by the arc are shown in Fig. 1.

Preheating

By following the procedure just described, many castings can be welded cold with this copper-nickel electrode and will be readily machinable, including the fusion line. However, two more factors of procedure are recommended for best machinability. One is a small amount of preheating of the casting to counteract or diminish the chilling effect of the base metal next to the weld. This preheat should not exceed 175 deg. C. Correct temperature is easily maintained by using temperature control crayons. In most cases only a local preheat with a torch is necessary.

Stress Relief Deposit

The second factor consists in depositing an additional bead on top of the first deposit, even though this second bead is superfluous and will be removed in machining. The effect of this second bead is to anneal or temper the slightly hardened layer of base metal immediately below the first bead. For best results this tempering bead should be deposited when the base metal has cooled down to between 150 and 175 deg. C.

Depositing an extra bead over the first bead has the further beneficial effect of annealing the first bead and removing the chance of cross fracture. A single-bead deposit has a cast structure with grain boundaries that do not always resist the contraction stresses that are set up when the deposit cools. When a second bead is deposited, the first bead becomes annealed.

Some Applications of Asbestos in the Foundry*

By F. J. McCulloch

The object of this Paper is to outline certain technical difficulties encountered by the Author in the production of three different types of iron castings and to explain how the difficulties were finally overcome by the use of asbestos yarn or sheet. It is proposed to deal with the various applications in the following order:—(1) The production of a large hydraulic cylinder; (2) The production of a solid wheel with a chill-cored centre, and (3) The production of a light casting requiring thickening all over.

Production of a Large Hydraulic Cylinder

The cylinder under consideration measured 9 ft. long by 1 ft. 8 in. dia., and had an overall wall thickness of 4 in. One end was open to the full extent of the bore, the other end being hemispherical with a 1¼ in. dia. hole through its centre. Both mould and core were made in loam sand.

Owing to the restricted opening on the hemispherical end of the cylinder (1¼ in. dia.), some apprehension was felt regarding the possibility of supporting the heavy core at this end through such a small hole, but after making the necessary calculations, it was found that a short length of 1¼ in. dia. mild steel rod, firmly screwed to the end of the main core barrel, would support the weight involved. This meant that the steel rod could pass through the centre of the hemispherical end, and still leave a machining allowance for cutting the 1¼ in. dia. hole required in the finished casting.

In view of the small dimensional difference between the diameter of the steel rod (1¼ in.) and the diameter of the hole in the hemispherical end of the cylinder (1¼ in.), it was thought that the simplest way of avoiding the difficulty of protecting the steel rod where it passed through the 4-in. end-section of the cylinder, was to leave the rod uncovered except for a coating of blackwash, which, it was hoped, would prevent fusion of the two metals during pouring of the casting. Later, however, this method had to be abandoned owing to fusion having taken place and owing to the difficulty experienced in extracting the core. Resulting from the foregoing practice, it was necessary after casting to cut off the protruding piece of rod and bore out the 1¼-in. hole in the casting. This created much inconvenience, as each casting had to be transported by wagon to the machine shop for cutting and boring before the core could be removed. After a further journey to the fettling shop the casting had to be returned once more to the machine shop for final machining.

On giving further thought to other possible methods of protecting the steel rod against the effect of the hot metal, the following technique was evolved.

The section of the steel rod exposed to the hot metal was wound with a single layer of ⅛ in. dia. asbestos yarn, prior to the setting of the core in the mould. An efficient insulating cover was thus formed, which successfully preevented fusion from taking place and greatly facilitated removal of the core. The core rod could be easily unscrewed from the core barrel and used again. The normal sequence of manufacture could thereafter be carried out in a much more economical fashion.

Production of a Solid Wheel with a Chill-cored Centre

The wheel under consideration was 6 in. diameter and 3 in. thick, and in order to ensure solidity within its centre it was found necessary to insert a chill throughout its axis. The chill used for the purpose was turned from 1 in. dia. mild-steel bar and had a taper of 2 deg. along the section which came in contact with the molten metal. At the commencement of production the chill was in one piece and located within the mould in suitably shaped core prints. Each chill was given a coating of plumbago wash and thoroughly dried before use.

Despite the liberal taper allowance on the sides of the chill and the refractory coating, considerable difficulty was subsequently experienced in removal of the chill after the casting had set. There appeared to be two reasons for this difficulty, *viz.*, (*a*) as the molten metal solidified and shrunk, the casting tightened its grip on the chill, and (*b*) as a result, the hot metal came into more intimate contact with the chill which caused fusion to take place.

The difficulty in extracting the chill was finally overcome by splitting each chill into two longitudinal sections and inserting an appropriately shaped piece of asbestos sheet ($\frac{1}{16}$ in. thick) between the half-sections. The split chill, due to the presence of the asbestos "cushion," was slightly compressible while the casting was contracting and, as a result, could be readily pushed out with the fingers when the casting was cold.

Production of a Casting Requiring Thickening

In light alloy foundry practice, it is sometimes necessary to thicken a pattern with the object of either strengthening the casting, adding extra machining allowance or preventing the occurrence of "misrun" castings. In cases where the alteration is of extreme urgency or only a limited number of castings are required, the desired additional thickness can be quickly and conveniently achieved without resorting to conventional patternshop practice.

The recommended procedure consists of making up the additional thickness required on the casting by in-

*This entry for a Short Paper Competition, organised by the Birmingham, Coventry and West Midlands Branch of the Institute of British Foundrymen, won the Second Prize.

Asbestos in the Foundry

serting a frame of soft asbestos sheet, of appropriate shape and thickness between the cope and drag parts of the mould. The internal shape of the frame should be cut slightly larger than the periphery of the mould cavity. Any metal "flash" subsequently formed at the joint can be trimmed off during fettling. The asbestos frame may be nailed to the drag prior to the closing of the mould, or left loose, depending upon the thickness of the asbestos sheet used. Where the mould cavity has a fairly even outline, strips of sheet can be used as an alternative to the one-piece frame, but under such circumstances it is advisable to nail the strips in position before closing the mould.

Where the casting is being thickened appreciably ($\frac{1}{16}$ in. to $\frac{3}{8}$ in.) and there are openings in the casting, it is advisable to place suitably shaped asbestos blanks within the mould with a view to preventing the formation of "flash" within the open areas of the casting.

Czechoslovak Foundrymen's Association

The 21st annual Congress was held in September and began with "Metallurgical Day," which was celebrated conjointly with the metallurgical section of the Union of Mining and Metallurgical Engineers in the old assembly hall of the Town Hall at Brno.

Mr. Korínek, chairman of the metallurgical section of the Union of Mining and Metallurgical Engineers, in an address, welcomed the members of the two associations as well as visitors from abroad, and stressed the importance of collaboration between the metallurgist and the foundryman. After this address the following papers were presented:—

Mr. S. R. Archer on the Present Conception in the United States concerning Constructional Alloy Steels; Mr. Albert Bureau on the Present Situation in the French Iron Industry; Mr. Georges Delbart on Recent French Studies in Step Quenching; Mr. P. Henry on Problems Arising from the Enrichment and Sintering of Iron Ores; and Mr. J. Robillard on Use of the Electron Microscope in Metallurgy.

The Congress proper opened on the next day, with Professor Pisek, president of the Czechoslovak Foundrymen's Association, in the chair. After having welcomed and thanked the foreign guests and the participants of the Congress, Professor Písek stressed the importance of the Congress for the foundry industry of the country. Mr. Benda intervened to welcome the participants in the name of the congress committee.

The Mayor of Brno, Mr. Podsedník, and the representative of the local government of Moravia, Dr. Hochmann, outlined in detail the situation of the country and the town after the war and the progress made. Following this there were speeches from the delegates of the technical universities, the industry and various corporations. The Congress was supported by an official delegation of the Bulgarian Ministry of Industry, who were warmly welcomed. Congratulatory messages were received from foreign Foundrymen's Associations, including those of Poland and Yugoslavia.

The election of the Minister of Foreign Affairs, Mr. Jan Masaryk, who has close connections with the foundry industry, to honorary membership, was received with acclamation

In his inaugural speech on "Metallurgy and Foundry Work in Primitive Times," Dr. Skutil underlined the fact that the region of Brno was already, in prehistoric times, the centre of metallurgy and foundry wok, as was shown by the numerous objects dating from the Hallstatt period found in this region, especially "Bycí Skála" (Bull's Rock). After the lecture an exhibition of numerous prehistoric objects concerning metallurgy and foundry work was opened in the Moravian State Museum.

That afternoon was devoted to the presentation of the following Papers, which were in two groups:—

Prof. P. Bastien and L. Beugras, on the "Influence of the Shape of Test Pieces and the Rapidity of Loading them on the dispersion of the Results of the Tensile Strength of Castings" (Exchange Paper of the French Foundrymen's Association).

Mr. A. Habart on "Development of the Czechoslovak Foundry Industry since 1945."

Mr. Z. Hostinsky on "Experiences in the Production of Blackheart Malleable Cast Iron."

Dr. Jenícek on "Contribution to the Theory of the Preparation of Moulding Sands."

Prof. Kieswetter on "Hydraulic Problems in Foundry Practice."

Mr. V. Samuel on "Outline of the Development of the Production of Foundry Coke since 1937."

Mr. Sochor on "Moravian Bell-founders and Bells."

Dr. L. Malkovsky on "Production of Light Alloy Castings."

In the evening a banquet was held, and on the following morning (Sunday) an excursion by motor coach was organised with the object of visiting "Byci Skála," where a prehistoric smithy and foundry of the Hallstatt (6th century B.C.) was recently discovered. In the evening the members visited the Brno National Theatre to hear Raphael Kubelik's opera "Veronika." On the Monday there was a visit to Foundry Institute of Professor Písek at the Dr. Edvard Benes's Technical University, where there was an exhibition of modern metallurgical and foundry literature. Following the inspection, the members assembled in the Brno Town Hall, where the closing meeting of the Congress was held with Prof. Písek in chair.

After a brief outline of the work of the Congress, Dr. Plesinger gave an address on "The Future of the Czechoslovak Foundries," and Prof. Cabelka outlined "The Present State of Foundries in Slovakia." At the Congress, where both the nationalised and independent foundries were represented by more than 300 participants, identity of technical interests was stressed and the principle of close collaboration between the two was endorsed as being essential for the success of the two years' economic plan for the industrial progress of Czechoslovak industry.

British Cast Iron Research Association

Report of the Annual General Meeting

At the annual general meeting, held in London yesterday, the 26th annual Report for the year ending June 30, 1947, was submitted. Extracts from it are printed below.

Nodular Cast Iron

Fundamental work upon the mechanism of graphite formation has been continued, and consequent upon this work, a process has been developed whereby nodular graphite structures can be obtained in as-cast grey cast irons without heat-treatment. Considerable attention has been paid to working out the details of this process, and the results obtained indicate that there is the possibility of producing grey cast irons with these structures, having mechanical properties considerably higher than those of previous high-duty grey cast irons. Work has been carried out upon the fundamental aspects of this discovery, and field tests have been carried out on a commercial scale so that an appreciation of its commercial value can be obtained. Cast irons with nodular graphite structures represent an entirely new material and it has been necessary to determine a wide range of mechanical properties in order to survey the field completely. Work upon the production and properties of these nodular cast irons has taken the place of work which has formerly been carried out upon high-duty grey cast irons.

A study has been made of the carbides occurring in cast irons and iron-carbon-silicon alloys of varying silicon content, and a silico-carbide phase has been discovered. The limits of composition over which this phase occurs have been investigated and a report will be published shortly giving details of this work. This investigation has provided some information upon the reasons for the graphitising influence of silicon.

Malleable Cast Iron

Work has been continued upon the formation of graphite during the malleablising process, using the dilatometric method of investigation. Two sensitive dilatometers have been in almost continuous use for this work. Valuable information has been obtained upon the influence of manganese and sulphur during annealing. The influence of these elements has also been studied in connection with the mechanical properties of the annealed material, and not only have full reports upon this been submitted to the Malleable Castings Sub-Committee, but a further report was given to the Annual Conference of the Institute of British Foundrymen in June, 1947. The effect of rate of heating upon mechanical properties and annealability has been studied and important new information brought to light. Further work upon malleable iron has included an investigation upon the use of magnetite annealing ore and upon the adherence of iron ore during the whiteheart malleable process. In connection with malleable cast iron, work has also been carried out upon the possibility of improving the life of annealing cans.

Related to the work mentioned above upon malleable cast iron, the investigation upon gaseous decarburisation has continued. This has involved a study of the influence of sulphur-containing gases upon the incidence of peeling, and the influence of metal composition when castings are annealed in sulphurous gases. Attention has also been paid to the annealing of white and grey cast iron in hydrogen and hydrogen/water-vapour atmospheres. It has been found that decarburisation in pure dried hydrogen occurs by a process not hitherto suspected.

A Worth-while Publication

The work of the metallurgical section of the research staff has made necessary an investigation for the purpose of developing new methods for the estimation of small amounts of the rarer elements in cast iron by chemical means. Several reports have been issued upon this subject and it is hoped shortly to have ready for the press a comprehensive book giving complete and detailed methods for the chemical analysis of cast iron and related foundry materials. The preparation of this book and the checking of various methods has involved much new investigational work. The application of spectrochemical methods to the analysis of cast irons has been continued and many refinements added to the technique. The instrument has been used for routine analyses on materials supplied by various members, with very satisfactory results. Attention has been paid to the estimation of small amounts of residual elements and to the various aspects of the photographic evaluation of spectrograms. A report has been prepared on this latter subject, which will shortly be available.

At the instigation of the Light Castings Sub-Committee, work has been begun on the fluidity of cast iron. This involves the development of a fluidity test suitable for light castings foundries and also the investigation of the various factors which influence fluidity. An investigation upon the possibility of improving the heat-resistance of iron used for the production of firebars and other castings made from phosphoric mixtures has been completed.

Fatigue Testing

In connection with the determination of special mechanical properties, work has continued upon fatigue testing and upon the development of suitable creep-testing procedure for cast irons. Stress-strain curves have been determined upon ingot mould material at elevated temperatures as part of work carried out for the British Iron and Steel Research Association. Other special properties which have been studied have included torsion, compression, shear and damping capacity, and reports upon various aspects of this work have been submitted to the appropriate Sub-Committees and Panels. Work has been begun on comparing the mechanical properties of ring sections with those of corresponding round test bars. Apparatus for the determination of

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mechanical properties at sub-zero temperatures has been perfected, and preliminary tests have been carried out. Internal stresses in iron castings have also been given attention and in this connection a start has been made with an investigation into the mechanism and rate of relaxation of stresses at elevated temperatures. With regard to special mechanical properties. considerable attention has been paid to determining the mechanical properties of nodular cast irons. Preliminary work has been carried out upon the influence of section size and shape upon the transverse properties of cast-iron beams, and work has been begun upon the interpretation of and explanation for the stress-strain curves which characterise cast irons.

Attention has been paid to the determination of the gas content of cast iron, particularly in respect of the methods to be applied for this determination. One vacuum fusion apparatus, using a graphite spiral heating element, is complete and in working order. Further apparatus is under construction both for the vacuum fusion and vacuum heating technique using high-frequency heating. A number of determinations have been carried out for gas content upon pig-irons and cast irons having anomalous characteristics.

Ladle Additions

Work upon ladle additions has been largely connected with the subject of graphite formation mentioned earlier, but in addition, experiments have been carried out to investigate the suitability of various silicides and silicon-containing compounds as inoculants in grey cast iron. Field tests have also been carried out upon a process for the production of a finely dispersed mottled structure in cast iron.

In order to provide more fundamental information with regard to phosphoric cast irons, a new investigation has been begun upon the mechanism of solidification in iron-phosphorus-carbon and iron-phosphorus-carbon-silicon alloys. Some interesting facts have emerged about the mechanism of solidification of the binary complex or eutectic in these systems. An investigation into the resistance of cast iron to thermal shock has been begun and a preliminary report issued to the appropriate Sub-Committee. This work has involved the construction of equipment for the repeated heating and quenching of small samples. Work has continued upon the corrosion of cast iron.

Cavitation of Propellers

Attention has been paid to the cavitation of cast-iron propellers and a high-speed rotor has been installed to study the effect of flow of seawater over cast iron. This investigation is taking place in conjunction with the British Shipbuilding Research Association. Various corrosion problems sent in by members have also been investigated. Experimental work upon sands has been continued with the examination of various substitutes for linseed oil and the use of pitch in moulding sands. The problem of rust-spotting on light castings has been studied and the reasons for its occurrence determined. A report upon this subject has been issued to the appropriate Sub-Committee. Apparatus for the study of stress-strain relationships in compression sand test pieces has been made.

New Equipment

As is always the case in a research organisation, much effort on the part of the research section of the staff has been devoted to the construction and examination of new equipment. Electronic temperature controllers have been constructed and improved, and with suitable modifications have been converted into programme controllers. A strain gauge bridge is under construction, thermal shock equipment has been completed, and apparatus for the determination of thermal conductivity is being set up. Improvements have been made in the method of gripping fatigue test specimens and considerable attention has been devoted to the study of extensometer technique for the determination of stress-strain curves at elevated temperatures. Apparatus for the study of stress relaxation in ring sections has been built and the work upon sub-zero testing has involved the construction of much new equipment. Several new furnaces have been installed and new electrical equipment has been installed and put into operation for spectrographic work. The physical metallurgy section has been equipped with a new highly sensitive potentiometer for temperature measurement.

Mobile Crane

C. H. Johnson (Machinery) Limited, Adswood Road, Stockport, have recently designed and placed upon the market a 10-cwt. electric runabout crane. Known as the "Mynne," this unit consists of a jib crane mounted on a 2-ton "Electricar" truck manufactured by Crompton Parkinson Limited. With a load of 10 cwt., the maximum permissible radius of operation is 13 ft. The speed of hoisting is 60 ft. per min., and the travel 4½ m.p.h.

A 320 ampere-hour battery provides power for both the hoist motor and the truckmotor. A special feature of this crane unit is that the crane can readily be removed from the truck, which can then be used separately. To facilitate this removal the hoist-motor is connected to the control cubicle through a special plug so that no permanent connections have to be undone.

Standards for Malleable Castings

The British Standards Institution announce the publication of B.S. Nos. 309 and 310:1947, which cover respectively whiteheart and blackheart malleable iron castings. They each cost 2s. and are available from the Institution at 24, Victoria Street, London, S.W.1.

MISS LILIAN K. POLZIN has been elected honorary secretary of the Twin City Branch of the American Foundrymen's Association and is the first of her sex ever to hold such a position.

Notes from The Branches

Scottish Branch—Falkirk Section

At the opening meeting of the session, a very large attendance of members and visitors were welcomed by the retiring President, Mr. William Montgomery. Mr. Robert O. Patterson, the Scottish Branch-President, and Mr. Tom Makemson, M.B.E., the General Secretary of the Institute, were introduced. Thereafter, Mr. Montgomery handed over the presidency to Mr. Wm. W. Blair, of Falkirk, who thanked the members for the honour they had bestowed on him.

Routine business having been carried through, Mr. Blair called on Mr. Makemson to relate to the Falkirk Section "Some Personal Impressions of American Foundry Practice." Mr. Blair also conveyed to Mr. Makemson the congratulations of the Falkirk members on his (Mr. Makemson's) recent award of the E. J. Fox gold medal.

Survey of American Practice

MR. MAKEMSON then proceeded to give a most interesting account of the observations and experiences during a tour of certain foundries in the United States of America. His opening remarks covered some facts on the size and disposition of all the foundries in the U.S.A., after which there was given an intimate picture of a certain foundry where cleanliness was the keynote of the entire business. Great stress was also laid by this firm on the personnel department and health service. Wooden pattern plates and flasks had been adopted on a wide scale. Maximum use was also made of all forms of mechanical handling.

A well-illustrated description followed of the method of casting employed in making a well-known automobile crankshaft. This method made use of a series of stacked cores, which were clamped firmly together on a pendulum conveyor. Metal for this casting was melted in an electric furnace. This foundry also used a form of centrifugal casting in the manufacture of certain small castings, where accuracy of shape and freedom from blowholes was required.

At a certain foundry in Chicago, the speaker was privileged to inspect a hot-blast cupola layout. In this plant cast-iron railway-car wheels were turned out, these wheels having chilled treads. A point of note was the use of Tellurium in order to retard graphitisation.

In Cincinnatti, Mr. Makemson had been able to operate a hydroblast installation where the operator controlled the unit from outside the cabin.

The final illustration described bath manufacture, adequate use being made of Speedslingers.

Salient Points

In conclusion, Mr. Makemson summarised observations thus:—

(1) Careful foundry planning took place in the U.S.A.

(2) Mechanical aids to handling were widely adopted.

(3) There seemed to be a faster rate of production by the operative than in this country.

(4) Maximum effort was being made to make the foundry a better place in which to work.

(5) Wooden patterns and flasks were in wide use.

(6) Cupola practice was equivalent to best English practice.

(7) Wages were higher, but cost of living was very high.

The CHAIRMAN first voiced his appreciation of Mr. Makemson's talk; then declared the meeting open for discussion.

Discussion

A VISITOR asked how costs compared with this country, and Mr. Makemson expressed the opinion that an American foundry could favourably compete with Great Britain in the production of castings. The same visitor was assured that prospects for young men in American foundries were very good, and maximum attention was paid to apprentice training.

MR. MAKEMSON was of the opinion that American-made baths were lighter than our own, but was assured by MR. D. M. WEBSTER that this was not the case.

MR. W. BLAIR asked the speaker what method was adopted to prevent the leakage of metal from the joints between the cores in the moulding of the cast crankshaft. MR. MAKEMSON said that he thought a paste was used.

MR. R. R. TAYLOR inquired as to the properties of the green sand used in the centrifugal casting of small castings, but MR. MAKEMSON regretted that he had not had the opportunity of ascertaining this.

MR. R. O. PATTERSON, Scottish Branch-President, commented that the presumable better production from the American than the British operative was no doubt due to the careful selection of labour for the foundry, which in this country was virtually impossible. He also commented on the fact that mechanisation made casting production very expensive.

MR. J. N. REID asked for further details of the mechanical furnace charger; also whether Mr. Makemson had seen any machine capable of making furnace pans. MR. MAKEMSON supplied the details reference the charger, but said that he had seen no machine for use in the making of pans, which were virtually unheard of in the U.S.A.

Another visitor was assured that craftsmanship was still to the fore in the American foundry industry, and very serious consideration was always given apprentice training. In spite of the wide adoption of mechanical aids to production, the basis of it all was, and always would be, skilled craftsmanship.

This being all the discussion, the meeting was brought to a close after due appreciation had been made, in the usual manner, of Mr. Makemson's very fine talk.

Employment in Ironfoundries

The October issue of the Statistical Bulletin of the Iron and Steel Federation shows that during September the average numbers at work in ironfoundries fell by 335 from 136,869 to 136,534. As compared with a year ago there is a gain of virtually 13,000. This issue contains an excellent account of the Swedish iron and steel industry.

News in Brief

THE SUNDERLAND FORGE & ENGINEERING COMPANY, LIMITED, are to erect a brassfoundry as part of a modernisation plan being carried out at the works.

A REVISED LIST of electrodes and processes approved for use in ship construction has been issued by the British Corporation Register of Shipping and Aircraft.

DAMAGE ESTIMATED at nearly £10,000 was caused by a fire which broke out on November 26 in the yard of William Simons & Company, Limited, engineers, etc., of Renfrew.

THE ANNUAL REPORT of the Coseley (Staffs) Juvenile Employment Committee states that it is noted with gratification that the number of boys taking up foundry work is increasing.

PLANS HAVE BEEN approved for the erection of a machine shop at the New Town Works of A. Reyrolle & Company, Limited, manufacturing electrical engineers, of Hebburn, Co. Durham.

THE YORKSHIRE SWITCHGEAR & ENGINEERING COMPANY, LIMITED, have acquired additional premises at Leeds and Churwell. The company have contracts on hand valued at more than £500,000.

BIRKENHEAD GAS COMMITTEE has accepted the £33,725 tender of the Power-Gas Corporation, Limited, Stockton-on-Tees, for the erection of a carburetted water-gas plant of 2 million cub. ft. capacity.

ROBERT STEPHENSON & HAWTHORNS, LIMITED, Newcastle-upon-Tyne, have completed the second of 28 locomotives ordered by the Burmese Government. The locomotive weighs 43 tons and is 36 ft. long.

IN DUBLIN CIRCUIT CIVIL COURT the appeal of the Hammond Lane Metal Company, Limited, Dublin, was allowed against a conviction of selling scrap lead in November, 1946, at a price in excess of the controlled price.

R. & W. HAWTHORN, LESLIE & COMPANY, LIMITED, Newcastle-upon-Tyne, and Smith's Dock Company, Limited, North Shields, have each received an order for a 10,000-ton motor tanker for the Athel Line, Limited, London.

THREE METRE-GAUGE 200-b.h.p. straight Diesel locomotives for mixed working on the Tanganyika Railways have been ordered from the Hunslet Engine Company, Limited, by the Crown Agents for the Colonies.

AN OFFER FOR SALE will shortly be made of 357,000 5 per cent. cumulative preference shares of £1 each at 21s. per share and 400,000 4s. ordinary stock units at 13s. 3d. per unit in Sheffield Twist Drill & Steel Company, Limited.

THE ADMIRALTY has offered the plant in the block (pulley) mills in Portsmouth dockyard as a gift to the Science Museum, South Kensington, London. The plant is one of the earliest examples of machine tools and of mass-production devices.

MR. A. O'CONNOR FENTON, a director of William Marples & Sons, Limited, tool manufacturers, of Sheffield, who has just returned from America and Canada, has said that Sheffield toolmakers will lose the Canadian market unless they can speed up deliveries which are being delayed by lack of steel.

THE MINISTER OF WORKS has authorised members of the National Association of Manufacturers of Salt-glazed Pipes and Conduits to increase the maximum selling prices by an addition of five points to the plusages on standard list prices. This is to cover the recent rise in the price of coal in railway freight charges.

MORE THAN 90 PER CENT. of the ordinary-share holders of A. C. Wickman, Limited, machine-tool specialists, of Coventry, have accepted the offer made by John Brown & Company, Limited, shipbuilders, of Clydebank, to purchase their shares. The directors of John Brown & Company have decided to give notice of their intention to acquire the remaining ordinary shares.

THE PRESIDENT OF THE BOARD OF TRADE has announced that he regards it as of great importance that all companies should comply with the provisions of the new Companies Act relating to accounts as soon as possible, but he recognises that it would not be practicable to bring them into force without reasonable notice. The requirements will, therefore, be brought into full operation on July 1, 1948.

THE DIRECTORS OF the Shotts Iron Company, Limited, have stated that since public intimation of capital-repayment proposals was made on November 5 last, it is understood that regulations under Section 25 of the Coal Industry Nationalisation Act, 1946, have been drafted. As these may affect the rights of the various classes of shareholders, the directors are delaying any capital-repayment proposals until the regulations are made and issued.

United Kingdom Tin Position

The Ministry of Supply has released the following figures showing the United Kingdom tin position for the month of October:—

		Ministry.	Consumers.
TIN METAL:		Long tons.	Long tons.
Stocks at October 1		6,387	3,082
Arrivals		—	—
Production		2,561	—
		8,948	3,082
Deliveries:			
To U.K. consumers	2,286	—	—
For export	224	2,510	2,286
		—	—
Consumption			5,368
Stocks at October 31		—	2,660
TIN ORE (Tin content):		6,438	2,708*
Stocks in U.K. at October 1		6,038	—
Stocks in U.K. at October 31		6,537	—

* Calculated. Reported 2,667 tons.

Operation Stockpiling

By "Onlooker"

One of the advantages as a "have not" nation, so far as indigenous supplies of non-ferrous metals are concerned, is that the British users are not subject to periodic attacks of "nerves" regarding the outlook for ore reserves. In order to pursue their avocation of manufacturing brass and copper products they must import zinc and copper, and the same thing goes for tin and lead, since what little exists here is very costly to work. The conditions leave no room for misunderstanding, and it is well known that in the case of these important non-ferrous metals they must be imported or the industry will go short. In the United States, however, matters are very different, for that great country is singularly well blessed with metal supplies, always excepting tin and nickel. The latter is available from Canada, and the Dominion is only too happy to export all that America requires, while in the case of tin the big Texas smelter can cope with the ore and concentrates which flow freely from Bolivia and other countries. The mining of copper, lead and zinc constitute important industries, and during the war very large tonnages of these metals, especially the first and the last, crossed the Atlantic on the basis of lend-lease arrangements. That movement has come to an end and the United States is now finding that Europe's call for non-ferrous metals is very much less than it was.

But in the opinion of a great many mining authorities across the Atlantic, America's non-ferrous metal reserves have been unduly depleted by the tremendous efforts made during the war years to supply the Allied cause. It would no doubt be true to say that a lot of American copper and zinc is scattered over the land area of the Old World in the form of brass shell cases and other battlefield scrap which is now in course of being gathered together for melting. That the copper mines in all the great producing areas suffered dislocation of their development plans through concentration on the immediate and vital task of raising output to the highest possible level can hardly be doubted, and some time must elapse before matters are straightened out again. What happened was that the rich seams were worked to death and the poorer sections left for another day. Now, and during the past months, there has been a reckoning up of the situation, and prophets of woe have not been lacking in the United States to foretell the exhaustion of ore reserves of copper, lead and zinc within a generation or more. This is no new cry in America, for it has always happened following a period of heavy consumption that alarm has arisen over the known reserves of those metals in which the United States, at any rate before the war, was on the whole self contained. On the other hand, alarm over America's diminishing metal supplies has been countered by robust argument that the situation is not after all so disturbing, since these theories were heard a couple of decades ago and will doubtless be under discussion a generation hence. Moreover, those who declare that America is not in danger of becoming a "have not" nation insist on the likelihood of other areas being developed and brought into production to take the place of the worked out mines. And, indeed, it is not many weeks since news was given of the development of a new copper-ore deposit in Arizona. True, the content of the ore is less than 1 per cent., but modern practice will not be dismayed by that.

However, in the background of opinion in the States to-day is a haunting fear that another world conflagration might find them short of these all important aids to the waging of war, and it will be remembered that before hostilities began the Americans had made a start on building up a strategic reserve of tin. This metal is probably their chief worry, and they are undoubtedly concentrating on putting a stock together in case of emergency. But there are fears about copper and zinc also, and it is only a few months since the battle of the 4 cents import duty on copper was won by those who feel that the domestic copper budget can only be balanced by importing foreign metal on a generous scale. It is true that production still falls short of demand, but the gap is closing and it may not be very long before the two are in balance once again. However, it appears that the exhaustion of the U.S. Government's wartime emergency stock has left rather a blank in the minds of metal people who have been pressing for the re-establishment of a national stockpile for some time past. It has lately been announced that the authorities have made a start in copper and zinc by inviting tenders for supplies, but those quoting are hedged around by a number of stipulations. Recently it has even been reported that stockpiling had begun, so presumably the Government has actually closed some deals. Details are lacking as to the prices paid and as to the origin of the metal, *i.e.*, whether of foreign or domestic origin, but, so far as copper is concerned, many have thought that offers at the current price level would not be very attractive to the authorities. This idea may or may not be correct, but if the Government really wishes to create an "iron ration" in copper and zinc, then too much insistence must not be laid on buying below the market quotation. After all, in the circumstances, it is the tonnage that matters!

U.S. Steel Output Forecast

Despite raw materials shortages and time consumed in repairing and rehabilitating equipment, 1947 steel-ingot output in the United States will be 34½ per cent. greater than the previous peacetime peak in 1929, 61 per cent. greater than the pre-war year of 1939, and about 30 per cent. higher than the year 1940, when the United States was shipping large tonnages to the Allies. According to the "Iron Age," New York, there is every indication that the total steel-ingot output this year will amount to 85 million net tons (of 2,000 lb.), a figure only 5.1 per cent. below the 1944 record output of 89.6 million tons. There is nothing in the picture now to prevent the 1947 record from being bettered in 1948, the "Iron Age" says. During the next 12 months new ingot capacity will be installed and finishing capacity will be expanded.

New Companies

("Limited" is understood. Figures indicate capital. Names are of directors unless otherwise stated. Information compiled by Jordan & Sons, 116, Chancery Lane, London, W.C.2.)

Hayes Heating & Steam Services, 15, Montgomery Road, Sheffield—£15,000. D. H. and M. Hayes.

Avebury Foundry, 1-3, Devizes Street, Poole Street, London, N.1—£1,000. G. E. A. and M. P. Heal.

B.J.S. Castings (Birmingham), 3, Lozells Road, Birmingham—£5,000. A. E. Homer and B. J. Stansbie.

Vin-Bar Sheet Metal Engineering Company, Berrington Chambers, 93, Tettenhall Road, Wolverhampton—£1,000.

Chromium Platers, 318, Paisley Road West, Glasgow—£1,000. T. A. D. Leslie, W. R. Morrison, and S. S. Schuster.

Newcastle Shipbuilding & Alloy Company—£6,000. J. Crass, 62, Grove Avenue, Hanwell, London, W.7, subscriber.

Wortham Blake & Company, 1394, High Road, Whetstone, Mdx—Engineers. £10,000. S. G., A. H., and P. G. Stanton.

Coldwell & Burke, L.M.S. Sidings, Wincobank, Sheffield—Iron and steel merchants. £10,000. W. F. and A. S. Simmons.

Holdens (Patternmakers), Victoria Works, Victoria Street, Clayton-le-Moors—£2,500. W. Holden, J. Walsh, and J. Pollard.

Don Valley Engineering Company, Midland Bank Chambers, High Street, Doncaster—£10,000. C. Fowler and G. R. Postlethwaite.

M. Joseph & Son (Birmingham), 158, College Road, Moseley, Birmingham—Manufacturers of aluminium, brass, bronze, etc. £5,000.

Griffiths, O'Driscoll & Company — Scrap - metal dealers, etc. £5,000. A. S. J. Griffiths, 73, Grosvenor Avenue, Carshalton Beeches.

West Riding Brass Works (Batley), 26, High Street, Hanging Heaton, Batley—£2,500. P. Jennings, W. A. Thatcher, and A. Richardson.

Contracts Open

Any date given is the latest on which tenders will be accepted. The address is that from which forms of tender may be obtained.

Camberwell, January 12—Cast-iron gulley grates and frames. manhole covers, etc., for the Borough Council. Mr. W. Bell, borough engineer and surveyor, Town Hall, Camberwell, London, S.E.5.

Huddersfield, December 23—Supply of (*a*) British standard cast-iron pipes; (*b*) British standard special castings; (*c*) special castings; and (*d*) surface boxes, for the Town Council. The Waterworks Engineer, 24, Ramsden Street, Huddersfield.

Kidsgrove, December 18—Grates and ranges, domestic boilers, etc., for the Urban District Council. Wood, Goldstraw & Yorath, Station Road, Tunstall, Stoke-on-Trent.

Obituary

MR. BASIL P. MARMONT, former director of the Dunkirk branch of Wright, Bindley & Gell, Limited, manufacturers of metal pressings, etc., of Birmingham, until his retirement about 10 years ago, died recently. He was 85.

MR. HUGH MURDOCH, formerly general secretary of the Ironfounding Workers' Union, died on November 28, at the age of 78. Mr. Murdoch was a moulder by trade, and until his retirement last spring had been general secretary of the union for 54 years.

MR. ROBERT WATSON, general works manager in Scotland of Stewarts and Lloyds, Limited, died on November 27. He joined the company as a young man and served successively in their Phœnix Tube Works, Rutherglen, Tollcross Works, and Clydesdale Iron & Steel Works, Mossend, before being appointed general works manager.

Recent Wills

DICKENSON, E. L., of Dronfield, Derbyshire, steel manufacturer £2,754

CATTELL, H. H., chairman of Paton (Noel), Limited, gear cutters, of Leeds £19,948

BECK, JOSIAH, retired cashier, late of Harland & Wolff, Limited, Belfast £10,532

BURRELL, U. F., head of A. R. Brown, M'Farlane & Company, Limited, iron and metal merchants and exporters, of Glasgow £45,938

ARMYTAGE, G. E., managing director of Armytage Bros. (Knottingley), Limited, manufacturers of bottle machinery, moulds, etc. £5,934

BAKER, MAJOR J. S., a director and former chairman of Baker Perkins, Limited, manufacturing engineers, etc., of Peterborough £12,138

HOLLIS, JOHN, of John Hollis & Company, steel agents, of Glasgow, and for 44 years Scottish representative of Thos. Firth & John Brown, Limited, Sheffield £13,031

VOISEY, T. J., managing director of T. J. Voisey, Limited, machinery, iron and steel, and scrap merchants, etc., of Bristol, for a long period a West of England representative of the British Iron and Steel Federation £7,333

Dorman, Long's Record Steel Output

Steel production at the Redcar Works of Dorman, Long & Company, Limited, during the week ended November 29 reached an all high record of 9,331 tons. The previous best at this plant was 9,220 tons in September, 1937. The company state that the performance of "D" furnace was particularly notable. This furnace of 90 tons capacity achieved an output last week of 1,621 tons. The output from the plate mills at the Redcar Works also established a record with 5,118 tons, compared with 5,012 tons in March, 1938.

During the year the whole of the Redcar steel plant has been converted to oil firing.

IN THE FIRST prosecution of its kind in Sheffield, the magistrates refused to order Metal Heat Treatment, Limited, to abate an alleged smoke nuisance.

Iron and Steel Distribution

Revised Scheme Announced

Following deliberations by a committee presided over by Mr. H. A. Marquand, Paymaster-General, and including representatives of the British Iron and Steel Federation, the Federation of British Industries, and the Trades Union Congress, revised arrangements for the distribution of iron and steel have been announced. The scheme is intended to stop over-authorisation; to provide means of eliminating the backlog of old orders; and to introduce a new form of authorisation, containing a legal statement of the obligations of those who receive steel. It provides for a considerably increased measure of bulk or direct authorisation. As many firms as possible will receive single authorisation or a few bulk authorisations direct from a Government department rather than a large number of sub-authorisations.

Outlining the new arrangements, Mr. Marquand said it was necessary to revise the present scheme to remove the effects of over-authorisation in the past and prevent it for the future. They must get rid of the heavy accumulation of out-of-date orders which were "clogging the machine."

It was proposed to displace the existing "M" form for steel (other than sheets and tinplate) by a new iron and steel authorisation. From March 31 next all old "M" forms would be cancelled and all orders placed under them, unless validated in advance under one of the new authorisations to be issued in January. During the first quarter of 1948 industry would be able to select which orders—old, currently placed, or entirely new—it chose to revalidate to use up its allocations. The rest would disappear and with them the congestion on steelmakers' books.

Direct bulk allocations of steel would be given to makers of components and common-service products. It was proposed to extend bulk authorisation where practicable.

Scunthorpe as a "Steel City"

A visit was paid by Mr. Jack Jones, Parliamentary Secretary to the Ministry of Supply, to the works of the Appleby-Frodingham Steel Company, Limited, at Scunthorpe, on November 28. He toured the blast furnaces and melting shops which recently created a new weekly output record of over 16,000 tons. "Scunthorpe, in the future, is going to be one of the biggest steel cities in the universe," Mr. Jones told the workers. "The object of the firm, of the country and of the plant and the skill which will work it is to compete with those countries who would like to keep us out of the picture."

LONDONDERRY DOCKYARD is to be revived by a new company headed by Mr. A. B. Swain, managing director of A. B. Swain & Company, Limited, Ware, Herts. The new company has been registered as Londonderry Shipyards, Limited, with a capital of £11,000.

New Patents

The following list of Patent Specifications accepted has been taken from the "Official Journal (Patents)." Printed copies of the full Specifications are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. each. The numbers given are those under which the Specifications will be printed, and all subsequent proceedings will be taken.

592,700 COLBERT, W. H., and WEINRICH, A. M. Method of coating articles by evaporation and deposition of metals.

592,809 CONSTANTINE, W. W. (General Motors Corporation). Locomotive underframe.

592,814 HOFFMAN-LA ROCHE & COMPANY AKT.-GES., F. Process for the manufacture of an injectable iron preparation.

592,857 ARNOLD, J. C. (Standard Oil Development Company). Prevention of corrosion of metal surfaces.

592,881 PILLANS, R. N. A., and MANUEL, J. Manufacture of turned or bright bolts.

592,902 METALECTRIC FURNACES, LIMITED, MORGAN, F. J., and FRANCIS, A. V. Muffle furnaces.

592,945 ELLIOTT, A. G., TALBOT, G. L., and ECCLES, G. O. Surface treatment of steel.

592,961 METAL PRODUCTS (TREFOREST), LIMITED, and GOLDSTEIN, D. Coil carriers for strip metal.

592,987 WESTINGHOUSE ELECTRIC INTERNATIONAL COMPANY. Surface treatment of laminations of ferrous magnetic material.

593,120 SOBY, W. Coating of surfaces with metal.

593,129 LINDE AIR PRODUCTS COMPANY. Methods and apparatus for the surface hardening of ferrous metal bodies.

593,298 PARAMOUNT ALLOYS, LIMITED, and HENBREY, H. J. Metal alloys.

593,562 SINTERED PRODUCTS, LIMITED, and LENNOX, J. W. Manufacture of porous metal articles and masses.

593,563 HAPER & COMPANY, LIMITED, J., and HINKS, B. Conditioning of moulding sand or the like.

593,639 BURGESS, A. F. (Freyn Engineering Company). Checker bricks for hot-blast stoves.

593,679 CALLITE TUNGSTEN CORPORATION. Coating of ferrous metal bases with metal.

593,693 JONES & CAMPBELL, LIMITED, JONES, J. F., and MUIRHEAD, D. P. Domestic and like boiler stoves.

593,697 MILLS, LIMITED, Executors of J., and Wragge, W. B. Pickling or descaling of ferrous metal.

593,795 FERRO ENAMEL CORPORATION. Coating of metallic articles with enamel.

Gas Turbine for Trafford Power Station

The Stretford and District Electricity Board has been directed by the Central Electricity Board to instal a 15,000-kw. gas-turbine driven generating plant at the Trafford Power Station. The new plant will be the first of its kind in the country, and is to be manufactured by Metropolitan-Vickers Electrical Company, Limited. It will operate on the open-cycle principle, burning fuel oil.

Company News

(Figures for previous year in brackets.)

Alvis—Dividend of 5% (6%).

British Rola—Dividend of 10% (15%).

Wright's Ropes—Dividend of 10% (same).

George Kent—Interim dividend of 4% (3%).

Bristol Industries—Interim dividend of 5% (same).

N. Greening & Sons—Interim dividend of 5% (2½%).

Allied Ironfounders—Interim dividend of 5% (same).

Joseph Lucas—Final dividend of 15%, making 17½% (15%).

Fuller's Earth Union—Interim dividend of 4% (same).

H. J. Baldwin & Company—Interim dividend of 10% (same).

Samuel Williams & Sons—Interim dividend of 7½% (same).

Smethwick Drop Forgings—Interim dividend of 10% (same).

Butler Machine Tool Company—Dividend of 12½% (same).

Hick, Hargreaves & Company—Interim dividend of 2% (same).

Banister, Walton & Company—Interim dividend of 5% (same).

Johnson Matthey & Company—Interim dividend of 3% (same).

Anderston Foundry Company—Interim dividend of 2½% (same).

John Brown & Company—Interim dividend of 3½%, tax free (same).

Marco Refrigerators—Final dividend of 22½%, making 30% (10%).

Hale & Hale (Tipton)—Final dividend of 15%, making 20% (same).

Rotherham Forge & Rolling Mills Company—Interim dividend of 5% (same).

B. & F. Carter & Company—Dividend of 10% (same) and bonus of 5% (nil).

Metal Box Company—Interim dividend of 5% on increased capital (5%).

Telephone Manufacturing Company—Interim dividend of 2½% (same).

Birmid Industries—Dividend of 10% and cash bonus of 10%, making 20% (same).

Halkyn District United Mines—Net loss for the year ended March 31, £3,788 (£2,111).

British Tabulating Machine Company—Final dividend of 10%, making 17½% (same).

British Electric Transformer Company—Final dividend of 10% (same), making 70% (50%).

A. E. Jenks & Cattell—Final dividend of 5%, tax free (same), making 10%, tax free (same).

Plessey Company—Final dividend of 10%, making 20% (30%) and capital bonus of 5% (nil).

Wailes Dove Bitumastic—Final dividend of 15% (same) and bonus of 2½% (nil), making 25% (20%).

Birfield Industries—Dividend of 12½% in respect of the period ended August 31 (12½% to November 30, 1946).

Lake & Elliot—Net profit for year to July 31 last, £27,777 (£22,140); final ordinary dividend of 15%, making 20% (same).

South Durham Steel & Iron Company—Dividend of 8½% (same) on the ordinary shares and of 2½% (same) on the "B" ordinary shares.

Thomas Locker & Company—Interim dividend of 10%. The company was incorporated in March and made public the following month.

Perry & Company (Holdings)—Net profit for the year ended July 31, £18,219 (£17,842); final dividend of 7½%, making 10% (same); forward, £24,934 (£23,809).

S. Smith & Sons (England)—Final dividend of 10½% on the 7% preferred ordinary shares, making 17½% (same) and a dividend of 37½% on the deferred ordinary shares (same).

Crittall Manufacturing Company—Net profit to August 31, £215,811 (£177,226); to contingencies, nil (£60,000); extension of pension schemes, £80,000 (nil); final dividend of 10%, making 20% (same); forward, £91,944 (£66,821).

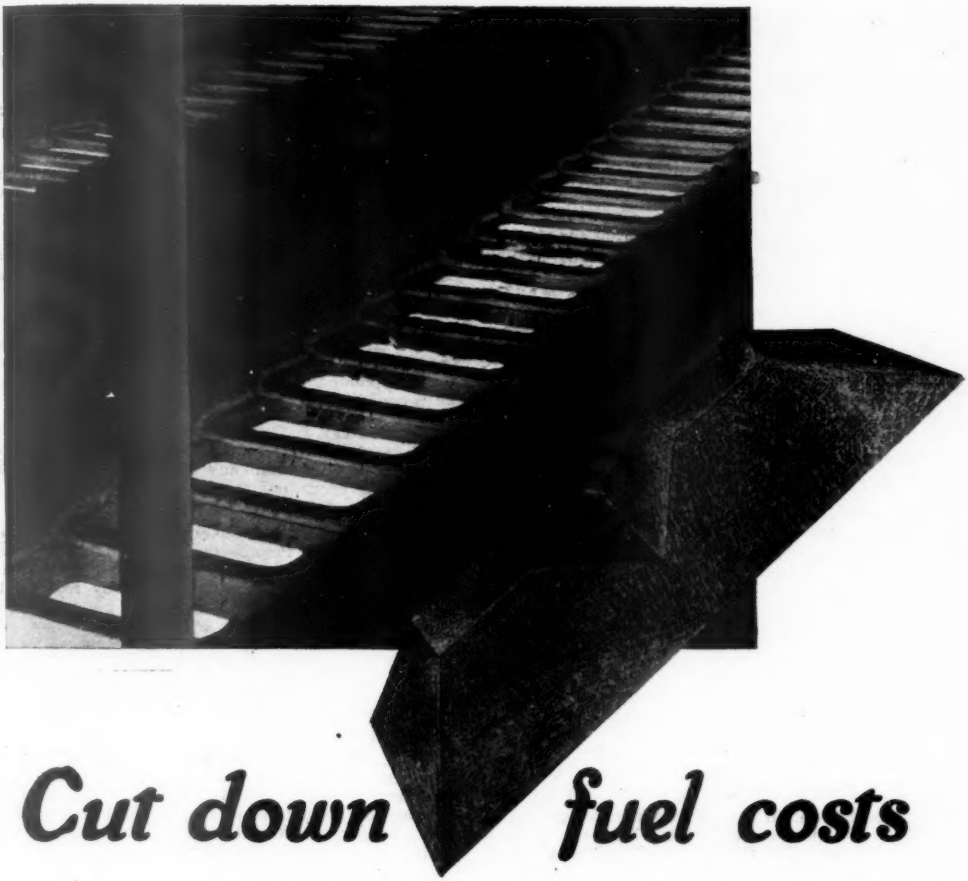
John Bedford & Sons—Profit for the year to September 30, after depreciation and taxation, £26,627 (£13,947); final dividend of 5% and bonus of 5%, making 20% (15%, including bonus of 5%); to reserve, £10,000 (£4,000); forward, £15,316 (£8,314).

Dowty Equipment—Trading profit for the year ended March 31, £40,329 (£66,972); dividends and interest, £3,926 (£1,685); to directors' fees, £1,401 (£1,600); interest, £116 (£4,710); final dividend of 7%, making 13%, tax free (20%, less tax); forward, £115,513 (£98,775).

Warne, Wright & Rowland—Balance for 1946, £20,836 (£16,583); plus previous year's adjustments, £927 (nil); war-damage reserve account not required, nil (£361); to general reserve, £9,000 (£8,000); final dividend of 32½%, making 40% (25%); forward, £18,847 (£19,317).

Edward Wood & Company—Net profit for the year ended August 31, after depreciation, etc., £44,292 (£42,132); to taxation, £22,500 (£20,000); deferred repairs, £2,000 (same); dividend of 10% (nil); to reserve, £5,000 (£10,000); allocation to employees' profit sharing, £2,500 (£3,000); forward, £26,481 (£25,189).

Electrolytic Zinc Company of Australasia—Net profit for the year ended June 30, after tax, £627,093 (£381,537); dividend of 17½% (11%); appropriation for new plant and development, West Coast Mines, ex-



Cut down fuel costs

Save fuel in your cupolas by using STANTON sandless machine-cast pig irons.

The STANTON IRONWORKS Co., Ltd., Near NOTTINGHAM

The largest producers of foundry pig irons for the free market in Great Britian.

pended during year, £15,217 (£14,146); transfer to general reserve, £85,000 (nil); forward, £216,985 (£215,109).

Morphy-Richards—Profit to June 30, £130,354 (£37,400); reserve not required, £414 (nil); to directors' fees, £175 (nil); royalties, £25 (same); fees, £610 (£420); depreciation, £3,894 (£2,754); experimental, etc., expenses, £5,311 (£3,959); directors' compensation for loss of office, £1,125 (nil); net profit, £119,628 (£30,242); to tax, £80,940 (£24,400); dividend of 160% (20%); forward, £21,587 (£7,357).

Sun Electrical Company—Trading profit for the year to April 30, £60,195 (£22,527); miscellaneous income, £350 (£632); to tax provision, £17,000 (£1,000); deferred repairs, £4,500 (£855); depreciation, £1,665 (£1,123); staff pension fund interest, £77 (£76); net profit, £37,304 (£20,106); dividend of 7½% (4½%); general reserve, £7,500 (nil); lease redemption reserve, £1,950 (£1,500); income-tax reserve, £4,000 (£3,500); forward, £8,125 (£2,144).

Walter Somers—Trading profit for the year to March 31, £76,251 (£19,271); E.P.T. recoverable, nil (£16,000); other income, £2,386 (£2,593); to income tax, £19,500 (£15,500); E.P.T. and profits tax, £12,000 (nil); depreciation, £21,790 (£13,404); balance, £19,691 (£3,305); surplus taxation in previous years, £15,000 (£17,692); to general reserve taxation surplus (*per contra*), £15,000 (£10,000); dividend of 50% (same); forward, £55,460 (£45,551).

Brush Electrical Engineering—Loss for 1946, £703,243; debit arising from adjustments for previous years in respect of wartime contracts, less favourable adjustments on civil contracts, £51,338; special provisions for turbine reconstruction and maintenance of buildings and plant, £152,711; total debit, £912,292 (profit, £45,447); brought in, £56,744; from revaluation of freehold land and buildings, £686,056; from reserve for renewals of plant, £120,000; debit balance forward, £49,292.

Drake & Gorham—Profit for the year ended June 30, including part profit to date on work in progress and investment income, £80,655 (£69,076); to general charges, £57,981 (£46,083); tax, £10,800 (£7,000); directors' fees, £597 (£1,000); preference share issue expenses, £2,206 (nil); debenture interest, £11 (£1,439); net profit, £9,060 (£13,554); dividend of 5% (same); forward, £31,297 (£30,206, after placing £4,537 to reserve for three years' dividends on the preference shares).

Stewarts and Lloyds of South Africa—Trading profit for the year ended June 30, £227,286 (£277,136); tax over-provided previously, £13,302 (£4,178); profit on realisation of non-trading assets, £38,542 (£2,254); dividends on investments, £8,493 (same); to depreciation, £44,076 (£44,869); debenture interest, £10,277 (£11,291); directors' fees, £2,794 (£3,126); net profit, £230,476 (£232,775); to general reserve, £100,000 (same); contingencies reserve, £10,000 (nil); debenture reserve, £6,900 (£6,000); dividend of 10% (same); forward, £87,175 (£91,099).

Personal

SIR FRANK SMITH has been appointed a director of Birmingham Small Arms Company, Limited.

MR. C. E. H. ECKERSLEY is to resign from the board of James Howden & Company, Limited, engineers, of Glasgow, on January 1, 1948.

MR. OLIVER GREEN has been appointed chairman of Benton & Stone, Limited, engineers, etc., of Birmingham, in place of MR. C. E. MILNER, who retains his position as managing director.

MR. J. H. METTRICK has been appointed North-Eastern representative of E. Boydell & Company, Limited, engineers, of Manchester, in succession to Mr. J. L. Loe, who died recently.

MR. GEORGE CATON, technical director of the Yorkshire Switchgear & Engineering Company, Limited, has been appointed managing director of the company in succession to the late Mr. W. H. Turner.

MR. STANLEY J. DYAL has been appointed a director of Thos. W. Ward, Limited, Sheffield. He has been chief valuer of the company for many years, his activities having been mainly concerned with industrial development and dismantling.

MR. ALBERT NEWBY, bakery-oven designer of Baker Perkins, Limited, Peterborough, retired recently. For the past three years he has supervised the training of the company's apprentices. Mr. Newby received two presentations to mark the occasion of his retirement.

MR. W. CRAFT, assistant head of the correspondence department of Swan, Hunter & Wigham Richardson, Limited, shipbuilders, of Wallsend, Northumberland, has been appointed head of the department and confidential secretary to the directors in succession to the late Mr. J. Peart.

MR. C. F. RUSSELL has been elected chairman and managing director of Specialloid, Limited, following the retirement of MR. H. N. BATES. MR. L. H. MAIDMAN, secretary of the company, MR. H. R. PETERS, general sales manager, and MR. R. A. CUTHBERT, general works manager, have joined the board.

MR. A. M. WHITEHOUSE, of Samuel Fox & Company, Limited, Stocksbridge, Sheffield, who wrote a Paper on the causes and defects in cold-rolled steel strip revealed by statistical methods, has received the first award of the prize presented by Newton Chambers & Company, Limited, to the Sheffield group of the Industrial Applications section of the Royal Statistical Society.

MR. R. F. HANKS has been appointed to succeed Sir Miles Thomas as vice-chairman of the Nuffield organisation. He was previously managing director of Nuffield Exports, Limited, and accompanied Lord Nuffield on his recent tour of the Dominions. MR. H. LANDSTAD, one of the original directors of Morris Motors, Limited, has retired after 33 years' service. He was largely responsible for designing the first Morris car engine.

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Raw Material Markets

Iron and Steel

Not least of the difficulties which are retarding the expansion of pig-iron production which is so urgently needed, is the disappointing output level in the ironstone mines. Fairly good stocks of imported ores have been accumulated, but with the usual decline of imports during the winter period, the obvious inference is that home production should be expanded. Steelmakers have had to encroach upon their stocks of pig-iron, though not perhaps to the same extent as the foundries, and the pressure for supplies of pig-iron for these establishments is intense. Hopes of increased deliveries after the turn of the year are dependent on the possibility of increasing the number of furnaces in blast.

It is reported that arrangements have been made to obtain from United States' sources shipments of steel on a more liberal scale than has recently been possible. This will be a welcome development, since home supplies of semis have never been able to satisfy the full requirements of the re-rolling industry. Billets are not quite so scarce as they were a short time ago, but defectives and scrap materials are being extensively used for the production of small bars. Slabs are also in reasonably good supply, but producers of light sheets are not getting their full quotas of sheet bars; this is all the more disappointing since the demand for the lighter gauges of black and galvanised sheets is very strong.

Heavy-steel makers are concentrating on accelerating their clearances before the end of the year. At consumers' establishments also there is the same sense of urgency which is inspired by the belief that either at the beginning of the New Year, or very soon afterwards, the new machinery for the allocation of steel will be put into operation. Full supplies will no doubt be provided for holders of P.M.L. forms, but it is feared that it will be more difficult for non-priority users to obtain authorisation. Meanwhile, shipbuilders are taking up their full allocations and, in many instances, complain that they have not been able to adhere to scheduled delivery dates because of short deliveries. Strip is wanted in increased tonnages for the tube works and the motor industry, and all wire products are heavily booked.

Non-ferrous Metals

There is every indication that the year will end on a very firm price trend so far as non-ferrous metals are concerned, for the weakness so much in evidence six months ago is now past, and most merchants and manufacturers are taking a bullish view of the market. The only free market in this country, scrap, is setting the pace, and values are forging ahead in a manner hardly justified by the requirements of the trade, which, as Christmas holidays and stocktaking draw near, tend to be reduced. Fabricators, however, are somewhat alarmed by the fact that 1948 promises to be a lean year so far as supplies of secondary metal from the Government are concerned. There will, of course, be material available, but it is likely to accrue from current breaking-down operations instead of from accumulated stocks, as has been the case this year. Undoubtedly, the Disposals Section of the Ministry of Supply has delivered many thousands of tons of brass and copper (especially the former) to the industry this year, in addition to shipments to the United States and Canada, but now the reservoir is empty.

In the U.S., copper is firm on the export market at 21.75 cents. per lb., f.a.s., which helps to narrow the margin insisted upon by the Ministry in fixing a selling price to British consumers. Even after making due allowance for ocean freight, insurance, and delivery to consumers' works, however, the British manufacturer is out of pocket compared with his Continental rival, who at present is so short of dollars that he is trying to buy such surplus copper from Africa as may be available. Despite the unfreezing of the balance of the American loan, the United Kingdom is not at all well placed for securing dollar copper, and Continental countries, too, even with the aid of the Marshall Plan, will not have a lot of margin after securing their foodstuffs and other essential requirements. For the present, however, the U.S. domestic market is maintaining a big demand and will take all that is offered, or nearly so. This qualification is very necessary as there is some reason to believe that the U.S. Government has actually made some purchases on account of its stockpiling programme.

U.N. Moves to Raise Steel Output

The Committee on Industry and Materials of the United Nations Economic Commission for Europe, which ended its first session at Geneva on November 28, has established a steel sub-committee to discuss means for increasing the production of steel and for using less scarce materials in its place. A new man-power sub-committee will consider the exchange of data on labour surpluses and deficiencies and will examine the ways in which workers from countries having surpluses of man-power can volunteer to go to those having deficiencies.

Gazette

THE ELECTROLYTIC IRON COMPANY, LIMITED, is being wound up voluntarily. Mr. E. T. Granger, Dowlais Chambers, West Bute Street, Cardiff, is the liquidator.

THE LEAD MANUFACTURERS' DEVELOPMENT ASSOCIATION, LIMITED, is being wound up voluntarily. Mr. J. C. Burleigh, 2, Surrey Street, Strand, London, W.C.2, is the liquidator.

MR. GWILYM WILLIAMS, formerly managing director of James & Company (B'ham), Limited, makers of centrifugal castings, of Halesowen, Worcs, died on December 3.